Original Article

ANATOLIAN CURRENT MEDICAL

DOI: 10.38053/acmj.1320463

Anatolian Curr Med J. 2023;5(4):305-310

The effect of thirdhand smoke belief on intention to quit smoking

Süleyman Özsarı[1], Derya Kocadağ[2]

[1]Department of Family Medicine, Faculty of Medicine, Bolu Abant İzzet Baysal University, Bolu, Turkey
[2]Statistician, Department of Information System and Statistics, Bolu Provincial Health Directorate, Bolu, Turkey

Cite this article as: Özsarı S, Kocadağ D. The effect of thirdhand smoke belief on intention to quit smoking. *Anatolian Curr Med J.* 2023;5(4):305-310.

Received: 27.06.2023 ◆ **Accepted**: 24.07.2023 ◆ **Published**: 27.10.2023

ABSTRACT

Aims: The study aimed to investigate the effect of thirdhand smoke perception (THS) on the intention to quit smoking.

Methods: We measured the perceptions of 285 smokers who admitted and did not admit to the smoking cessation outpatient clinic by the Third Hand Smoke Scale (THS) and their addiction by the Fagerström Nicotine Addiction Scale (FNAS). The factors affecting the intention to quit smoking were examined by logistic regression analysis.

Results: While 88.8% of the participants heard about passive smoking, only 14.4% stated that they had heard of thirdhand smoke. Those admitted to the smoking cessation outpatient clinic, those who had at least one smoking quitting attempt, those who wanted to quit smoking, those with high addictions, and those who were banned on smoking at home had a high THS perception, but no difference was observed in the parents.

Conclusion: Although SHS is high in smokers, we believe there is a need for the perception of THS to be supported to want and try to quit smoking. Even though the perception of THS, which has been studied for more than 10 years, is not at the desired level, it will be a strong psycho-technique with the concrete data it reveals in quitting smoking with the social training and orientations to be given.

Keywords: Perception of thirdhand smoke, perception of secondhand smoke, smoking cessation outpatient clinic

INTRODUCTION

Tobacco use is the leading preventable cause of morbidity and mortality in Turkey and the world.[1] At the same time, approximately 7-8 million people die from smoking-related causes each year (2018 WHO world health statistics), while more than 1 million people die from indirect exposure to cigarettes.[2-4] So far, the deaths due to COVID-19 are far below the deaths due to tobacco use and exposure each year.[5]

THS is residual tobacco smoke contamination left after the cigarette is put out and unlike SHS it is invisible and stays in the environment, clothing, hair of smokers.[6-8] SHS measures, such as airing the room, opening the windows, or smoking only in certain areas, cannot prevent or eliminate THS.[9,10] People are exposed to THS in 3 ways: Ingestion of nicotine-contaminated house dust, dust adhering to fabrics/surfaces absorbed through the skin, and converted into a respirable secondary polluting gas in the form of tobacco-specific nitrosamines (TSNA).[7,10]

In studies conducted, 35% of non-smokers and 57% of smokers think that THS does not harm children,[6] and those with high addiction (>10) have a low perception of THS harm.[11] On the other hand, according to the 2016 Global Adult Tobacco Survey (GATS), 83.3% of adults think that breathing someone else's smoke causes severe diseases in non-smokers, and 95.4% believe it will cause lung disease in children. These results indicate that although there is a general public awareness about the harms of SHS, people do not have enough knowledge and awareness about THS, which has been discussed since 2009, and their attitudes and beliefs are not yet developed. However, limited studies have demonstrated increasing knowledge about the adverse health effects of smoking and the belief that THS harms children. It has been shown that THS awareness would contribute to a decrease in smoking, an increase in smoking cessation attempts, and the adoption of smoke-free home/car policies.[4,6,7,9,11,12]

Although studies on thirdhand smoke are few in our country, there is not enough concrete data reported on awareness and exposure to thirdhand smoke. Hence, the present study aimed to measure the effect of thirdhand smoke belief on the intention to quit smoking in our study.

Corresponding Author: Süleyman Özsarı, beyhekim06@gmail.com

This work is licensed under a Creative Commons Attribution 4.0 International License.

METHODS

The study was initiated with the approval of the Bolu Abant İzzet Baysal Training and Research Hospital Ethics Committee (Date: 27.04.2021, Decision No: 2021/69). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

A total of 567 outpatients were admitted to the Family Medicine Clinic of Training and Research Hospital between March 15, 2021, and June 15, 2021. Among of them for quitting smoking admitted 270, and the other complaints admitted 297. A total of 285 outpatients was selected through stratified sampling from those who outpatient applied to the family medicine clinic as 129 (who were admitted to the smoking cessation outpatient clinic) and 156 (who were not admitted to the smoking cessation outpatient clinic). The inclusion criteria of study were to be over 18 years old, to be literate, have cognitive functions and active smoker. Those who did not comply with these conditions were not included in the study. Patients admitted to the Smoking Cessation Outpatient Clinic at the time of the study were considered as the group that wanted to quit smoking and those who smoked but never admitted to the smoking cessation outpatient clinic at the time of the study as the group that did not want to quit. It was selected through stratified sampling from those who applied to the family medicine clinic. Intention to quit smoking was measured by the survey question "Do you want to quit smoking." Information about the study was given online, and consent to participate in the survey was obtained. It was collected from voluntary participants via the Thirdhand Smoke Scale (THS) and Fagerström Nicotine Addiction Scale (FNAS).

Compliance with the normal distribution was examined based on the skewness and kurtosis coefficients and the range of ±2. Parametric data were expressed as mean±standard deviation using the Independent Sample t-test or One-way ANOVA test; nonparametric data were presented as median (min-max) deviation using the Mann-Whitney U test via SPSS18. The correlation between continuous variables was examined by Spearman correlation analysis, categorical variables was examined by Chi-Square analysis and were expressed as counts and percentages. The factors affecting the intention to quit smoking were examined by logistic regression analysis. If the cells have an expected count less than 5 was expressed Fisher-exact test. A p-value of <0.05 was considered statistically significant. Cronbach Alpha was 0.928 for THS, and 0.715 for FNAS and both scales were reliable. Also, it was decided since KMO and Bartlett's test value is 0.890, sampling adequacy is enough.

RESULTS

When **Table 1** was examined, 176(61.8%) participants were male and 195(68.4%) were married. It was stated that 183(64.2%) had at least one child, 164(57.5%) lived with their spouse and children, 174(61.1%) had smoker parents, and 246(86.4%) stated that they had full bans on smoking at home. Only 14.4%(n:41) of the participants stated that they had heard of thirdhand smoke. Participants who wanted to quit smoking (n:187, 65.6%) and those who had at least one smoking quitting attempt (n:216, 75.8%) had higher rates of applying to the smoking cessation outpatient clinic. While the mean age, years of smoking, daily smoked cigarettes, THS, and FNAS averages were higher in the group admitted to the smoking cessation outpatient clinic, the age of onset of smoking was lower.

Table 2 revealed that THS did not show a difference for the variables of gender, parentage, and parental smoking status. However, the mean THS of the participants who wanted to quit smoking, who had at least one smoking cessation attempt, who stated that they had heard of the concept of passive smoking before, and who had complete bans on smoking at home were higher. FNAS scores for the variable of having children didn't differ. While male participants, those who wanted to quit smoking, those who had at least one smoking cessation attempt, and those whose parents smoked had higher FNAS scores; those who stated that they had not heard of passive smoking before had lower FNAS score.

Table 3 indicated that THS positively correlated with the variables of wanting to quit smoking, trying to quit smoking, and hearing of passive smoking before. However, there was no correlation between hearing of thirdhand smoke before and THS. The model was compatible with the dataset as per the Hosmer and Lemeshow test result for logistic regression analysis (dependent variable: intention to quit smoking) (X_2^8:10.101, p=0.183), and the model formed by the explanatory variables was significant as per the omnibus test result (X_2^6:43.926, p<0.001). The gender of the person, whether there was a smoking cessation attempt, whether or not to smoke, and thirdhand smoke belief were effective in terms of wanting to quit smoking. The thirdhand hearing variable was not significant for this model. 19.7% of the change in the dependent variable, wanting to quit smoking, can be explained by the independent variables such as gender, attempt to quit, passive smoking, and belief in thirdhand smoke (R^2: 0.400).

Table 1. Comparison of socio-demographic characteristics of the groups (n=285)

		Who admitted to the SCOC# (n=129, %45.3)	Who not admitted to the SCOC# (n=156, %54.7)	All patients (n=285)	p-value
Gender	Female Male	43 (33.3%) 86 (66.7%)	66 (42.3%) 90 (57.7%)	109 (38.2%) 176 (61.8%)	0.121[a]
Marital status	Married Single	85 (65.9%) 44 (34.1%)	110 (70.5%) 46 (29.5%)	195 (68.4%) 90 (31.6%)	0.403[a]
Have children	Yes No	85 (65.9%) 44 (34.1%)	98 (62.8%) 58 (37.2%)	183 (64.2%) 102 (35.8%)	0.590[a]
Whom do you live with	Alone Only with spouse With wife and children Other	20 (15.5%) 17 (13.2%) 68 (52.7%) 24 (18.6%)	17 (10.9%) 21 (13.5%) 96 (61.5%) 22 (14.1%)	37 (13.0%) 38 (13.3%) 164 (57.5%) 46 (16.1%)	0.392
Parent smoking status	Yes No	78 (60.5%) 51 (30.5%)	96 (61.5%) 60 (38.5%)	174 (61.1%) 111 (38.9%)	0.853
Thirdhand hearing	Yes No	16 (12.4%) 113 (87.6%)	25 (16.0%) 131 (84.0%)	41 (14.4%) 244 (85.6%)	0.386
Smoking cessation attempt	Yes No	129 (59.7%) 0 (0%)	87 (40.3%) 69 (100.0%)	216 (75.8%) 69 (24.2%)	<0.001*[c]
Rule Regarding Smoking at Home	Yes No	116 (89.9%) 13 (10.1%)	130 (83.3%) 26 (16.7%)	246 (86.4%) 39 (13.7%)	0.121
Passive smoking hearing	Yes No	104 (80.6%) 25 (19.4%)	149 (95.5%) 7 (4.5%)	253 (88.8%) 32 (11.2%)	<0.001*
THS awareness among conscious smokers	Passive (+) Thirdhand (-) Others	88 (68.2%) 41 (31.8%)	124 (79.5%) 32 (20.5%)	212 (74.4%) 73 (25.6%)	0.030*
FNAS	Low (0-3 points) Medium (4-6 points) High (≥7 points)	30 (23.3%) 43 (33.3%) 56 (43.4%)	86 (55.1%) 48 (30.8%) 22 (14.1%)	116 (40.7%) 91 (31.9%) 78 (27.4%)	<0.001*
			$\bar{x}$±sd		
Age		39.1±12.3	36.1±8.2	37.4±10.4	0.018*[,b]
Years of smoking		20.8±12.1	16.5±8.8	18.4±10.6	0.001*[,b]
Daily number of cigarettes		23.1±11.4	14.2±8.1	18.2±10.7	<0.001*[,b]
THS		35.8±5.0	33.4±7.8	34.5±6.8	0.002*[,b]
FNAS		5.7±2.7	3.6±2.6	4.5±2.8	<0.001*[,b]
			Median (min-max)		
Age of start smoking		17 (9-41) 18.3±5.2	19 (10-39) 19.6±4.7	18 (9-41) 19.0±4.9	0.002*[,b]

#SCOC: smoking cessation outpatient clinic, [a]Chi-Square test [b]Independent Sample t test/Mann-Whitney U test [c]Fisher Exact test *Statistically significant

Table 3. Correlation between scales and logistic regression analysis

		Will to quit smoking	Smoking cessation attempt	Passive smoking hearing	Thirdhand hearing
Thirdhand Smoke Scale (THS) r p-value		 0.274 <0.001*	 0.215 <0.001*	 0.153 0.010*	 0.105 0.077
	Beta	**Standard Error**	**Exp (B) Odds Ratio**	**%95 CI for Exp(B) Lower - Upper**	**p-value**
Constant	-1.835	0.883	0.160	-	0.038*
Your gender	0.633	0.278	1.884	1.091-3.251	0.023*
Number of children	0.226	0.283	1.254	0.719-2.185	0.425
Passive smoking hearing	-1.844	0.615	0.158	0.047-0.528	0.003*
Thirdhand hearing	-0.183	0.375	0.833	0.399-1.738	0.626
THS	0.111	0.022	1.117	1.069-1.167	<0.001*
The total ban at home	-0.559	0.388	0.572	0.267-1.223	0.149

n=285; -2 Log Likelihood:322.904 R^2:0.143 (Cox & Snell), R^2=0.197 (Nagelkerke), r: Spearman correlation coefficient *Statistically significant

Table 2. Comparison of THS and FNAS scales by demographic characteristics

	THS	FNAS
Gender	**	**
Female	33.7±6.2	3.9±2.7
Male	34.9±7.1	4.9±2.9
p-value	0.153	0.001*
Have children	**	**
Yes	34.3±6.4	4.4±2.8
No	34.7±7.3	4.8±2.9
p-value	0.635	0.233
Will to quit smoking	**	**
Yes	35.8±5.4	4.9±2.8
No	31.9±8.3	3.7±2.8
p-value	<0.001*	0.001*
Smoking cessation attempt	**	**
Yes	35.3±5.8	4.8±2.8
No	31.9±8.7	3.8±2.8
p-value	0.003*	0.014*
Parent smoking status	**	**
Yes	34.3±6.8	4.9±2.8
No	34.8±6.7	3.9±2.9
p-value	0.498	0.009*
Passive smoking hearing	**	**
Yes	34.8±6.5	4.3±2.8
No	31.6±8.2	6.2±2.9
p-value	0.010*	<0.001*
Rule at home		
None/Partial	34.1±6.8	4.7±2.8
Yes	36.7±5.9	3.5±3.1
p-value	0.027*	0.015*
FNAS	**	-
Low (0-3 points)	34.9±6.4	
Medium (4-6 points)	34.1±6.7	
High (≥7 points)	34.2±7.4	
p-value	0.570	
The relationship between will to quit smoking and outpatient clinic application	**	**
Will (+) Plc (+)[1]	35.8±5.0	5.7±2.7
Will (+) Plc (-)[2]	35.9±6.2	3.3±2.4
No will[3]	31.9±8.3	3.7±2.8
p-value	<0.001*	<0.001*
	1,2>3 (p<0.001*)	1>2,3 (p<0.001*)
Correlation between attempt and will to quit smoking	**	**
Attempt (-) Will (+)[1]	37.9±4.7	2.2±1.8
Attempt (-) Will (-)[2]	29.9±8.8	4.3±2.9
Attempt (+)[3]	35.3±5.8	4.8±2.8
p-value	<0.001*	<0.001*
	2<1,3 (p<0.001*)	1<2,3 (p<0.001*)

* Statistically significant **Independent sample t-test/One-Way ANOVA (mean±standard deviation)

DISCUSSION

The present study is the first to investigate the effect of THS perception on the intention to quit smoking in smokers. Studies have shown that smokers' increased knowledge and beliefs about the harms of THS positively affect their intention to quit smoking.[1,12]

Similar to the studies of Escoferyy[7] and Rendon[9] 86% of the participants in our study stated that they had not heard of the concept of thirdhand smoke and did not know what it was. This situation can be perceived as proof that the awareness of THS perception has not changed over the years and that the awareness of harm perception has not yet been settled. Our study determined that the will to quit smoking was correlated with the increase in THS perception. While those who tried to quit smoking at least once constituted 20-25 percent of smokers.[13,14] this rate was close to the ratio of 18.9% in our study. We demonstrated that smokers who tried to quit smoking at least once were admitted to the outpatient clinic by taking action (who wanted to quit), had a high sensitivity to passive smoking, and had complete bans at home had high THS perceptions. The fact that the desire to quit smoking and the attempt to quit smoking occur with the increase in the perception of THS in smokers is manifested by the high rates of admission to the outpatient clinic.

It is known that avoiding smoking and exposure from a very early age will protect from cardiovascular risks, and smoking cessation is beneficial in reducing the risk even in older adults.[15] The fact that THS awareness increases as the perception of THS increases in individuals who have a long period of smoking, who start smoking at an early age, who have a high addiction, and who are elderly, reveals the importance of THS awareness.

While the average daily amount of cigarettes per capita in Turkey is 17.1 (Health Statistics Yearbook-2020), the daily consumption of those who were admitted to the polyclinic is higher in our study (mean: 23.1). Besides, while the increase in cigarette addiction along with the increase in daily cigarette consumption in studies reduces the perception of THS harm,[11] we did not find a difference in our study. However, the high sensitivity of secondhand smoke in both groups, who want to quit smoking and those who do not, suggests that the perception of harm from secondhand smoke turns into depersonalization and reduces taking an active role in smoking cessation. Besides, the high THS perceptions of those who have tried to quit at least once may provide evidence for the decision to quit smoking to turn into action.

While it is difficult to measure the extent of THS exposure precisely, children living with smokers are exposed to SHS and, inevitably, simultaneously to THS. Contrary to studies.[6,11,12,16] reporting that parents and those who

set rules about smoking at home have high THS harm perceptions, in our study, although parents and rule makers showed more smoking cessation attempts, being a parent was not significant for THS perception, but THS perception was high for rule makers. According to our study, the exposure rate of children to THS is 63.8%. Targeting parents and emphasizing the negative effects of THS on child development and health with scientific data can be a crucial element in promoting smoking bans at home for the perception of THS harm to become significant in parents.

It was stated that having a smoke-free house/car in the establishment of THS harm perception is associated with advice/direction, not asking questions about tobacco use and that THS-related messages will motivate people to make their homes smoke-free.[11,17,18] We think that the guidance of health professionals will contribute to the increase in the perception of THS harm and the intention to quit.

CONCLUSION

The present study determined that smokers who tried to quit smoking and had a high sensitivity to passive smoking had high THS perceptions. We saw that all data, including this high perception, significantly affected quitting smoking and strengthened the intention to quit smoking. We have determined that strengthening the perception of THS at all levels of smoking addiction, regardless of the degree of addiction, will play an active role in creating positive behavioral changes in smoking cessation.

Rather than repeating what is known as SHS, we think that the perception of THS, strengthened by training and awareness, will bring a new perspective and strength to the struggle to quit smoking. This, in turn, will make people who are resistant to quitting smoking more susceptible; and will brick the gap between scientific and popular understanding of the harms of THS up, which is supported by scientific evidence but not yet adopted; and will contribute to raising public health awareness.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was initiated with the approval of the Bolu Abant İzzet Baysal Training and Research Hospital Ethics Committee (Date: 27.04.2021, Decision No: 2021/69).

Informed Consent: Written consent was obtained from the patient participating in this study.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper and that they have approved the final version.

REFERENCES

1. Gupta AK, Nethan ST, Mehrotra R. Tobacco use as a well-recognized cause of severe COVID-19 manifestations. *Respir Med.* 2021;176:106233.
2. Özgür Ö, Evcil FY, Eroğlu HN, et al. Üçüncü el sigara dumanı hakkında farkındalık ölçeği Türkçe formunun geçerlik ve güvenirlik çalışması. *SDÜ Tip Fak Derg.* 2021;28(3):499-506.
3. Öberg M, Jaakkola MS, Woodward A, Peruga A, Prüss-Ustün A. Worldwide burden of disease from exposure to second-hand smoke:a retrospective analysis of data from 192 countries. *Lancet.* 2011;377(9760):139-146.
4. Ahluwalia IB, Smith T, Arrazola RA, et al. Current tobacco smoking, quit attempts, and knowledge about smoking risks among persons aged ≥15 years-global adult tobacco survey, 28 countries, 2008-2016. *MMWR Morb Mortal Wkly Rep.* 2018;67(38):1072-1076.
5. Ioannidis JP, Jha P. Does the COVID-19 pandemic provide an opportunity to eliminate the tobacco industry? *Lancet Glob Health.* 2021;9(1):e12-e13.
6. Winickoff JP, Friebely J, Tanski SE, et al. Beliefs about the health effects of "thirdhand" smoke and home smoking bans. *Pediatrics.* 2009;123(1):e74-e79.
7. Escoffery C, Bundy L, Carvalho M, et al. Third-hand smoke as a potential intervention message for promoting smoke-free homes in low-income communities. *Health Educ Res.* 2013;28(5):923-930.
8. Shehab K, Ziyab AH. Beliefs of parents in Kuwait about thirdhand smoke and its relation to home smoking rules: a cross-sectional study. *Tob Induc Dis.* 2021;19(66):1-13.
9. Rendón AD, Unger JB, Cruz T, Soto DW, Baezconde-Garbanati L. Perceptions of secondhand and thirdhand smoke among Hispanic residents of multiunit housing. *J Immigr Minor Health.* 2017;19(1):162-169.
10. Matt GE, Quintana PJE, Hovell MF, et al. Households contaminated by environmental tobacco smoke: sources of infant exposures. *Tob Control.* 2004;13(1):29-37.
11. Drehmer JE, Ossip DJ, Rigotti NA, et al. Pediatrician interventions and thirdhand smoke beliefs of parents. *Am J Prev.* Med. 2012;43(5):533-536.
12. Hayrumyan V, Harutyunyan A, Torosyan A, et al. Tobacco-related risk perceptions, social influences and public smoke-free policies in relation to smoke-free home restrictions:findings from a baseline cross-sectional survey of Armenian and Georgian adults in a community randomised trial. *BMJ Open.* 2022;12(2):e055396.
13. Kotz D, Batra A, Kastaun S. Smoking cessation attempts and common strategies employed. *Dtsch Arztebl Int.* 2020;117(1-2):7-13.
14. Hagimoto A, Nakamura M, Morita T, Masui S, Oshima A. Smoking cessation patterns and predictors of quitting smoking among the Japanese general population:a 1-year follow-up study. *Addiction.* 2010;105(1):164-173.
15. Mons U, Müezzinler A, Gellert C, et al. Impact of smoking and smoking cessation on cardiovascular events and mortality among older adults: meta-analysis of individual participant data from prospective cohort studies of the chances consortium. *BMJ.* 2015:350. doi:https://doi.org/10.1136/bmj.h1551

16. Drehmer JE, Ossip DJ, Nabi-Burza E, et al. Thirdhand smoke beliefs of parents. *Pediatrics*. 2014;33(4):e850-e856.
17. Fallavollita WL, Do EK, Schechter JC, et al. Smoke-free home rules and association with child secondhand smoke exposure among mother-child dyad relationships. *Int J Environ Res Public Health*. 2021;18(10):5256.
18. Liu B, Zhan S, Wilson KM, Mazumdar M, Li L. The ınfluence of ıncreasing levels of provider-patient discussion on quit behavior:an ınstrumental variable analysis of a national survey. *Int J Environ Res Public Health*. 2021;18(9):4593.